

We claim:

1. A compound of formula:



5 wherein:

G is a lipophilic moiety capable of incorporating into a lipid membrane;

L is a cleavable linker;

E is an electrophoretic tag; and

m is an integer greater than 1 and less than 100.

10

2. The compound of claim 1, wherein the lipid membrane is derived from a cell.

3. The compound of claim 1, wherein the lipid membrane is a liposome.

15

4. The compound of claim 1, wherein G is an alkyl group, a phospholipid or a transmembrane domain.

5. The compound of claim 4, wherein G is an alkyl group.

20

6. The compound of claim 5, wherein the alkyl group has about 10 to 20 carbon atoms.

7. The compound of claim 6, wherein the alkyl group is straight chain.

8. The compound of claim 6, wherein the alkyl group is alicyclic.

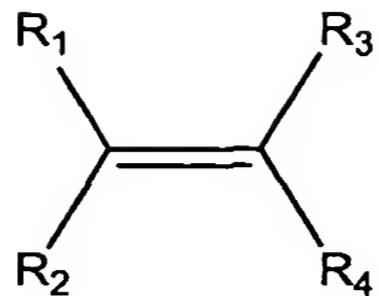
25

9. The compound of claim 1, wherein the cleavable linkage is an oxidation-labile linkage.

10. The compound of claim 9, wherein the oxidation-labile linkage is selected from the group consisting of olefins, thioethers, selenoethers, thiazoles, oxazoles, and imidazole.

30

11. The compound of claim 9, wherein the oxidation-labile linkage is an olefin having the structure:



where  $R_1$ -  $R_4$  are independently selected from the group consisting of hydrogen, heteroatom, alkyl, heteroalkyl, heteroaryl, heteroaralkyl, aryloxy, aryl, substituted aryl, hydroxyaryl or substituted hydroxyaryl, acyloxyaryl or substituted acyloxyaryl, silyloxyaryl or substituted siloxyaryl, aminoaryl or substituted aminoaryl, and sulfonamidoaryl or substituted sulfonamidoaryl.

5           12. The compound of claim 11, wherein at least one of  $R_1$ -  $R_4$  is a heteroatom.

10           13. The compound of claim 12, wherein the heteroatom is O, S, or N.

              14. The compound of claim 13, wherein two of  $R_1$ -  $R_4$  are heteroatoms.

              15. The compound of claim 14, wherein the heteroatoms are independently O, S, or N.

15           16. The compound of claim 14, wherein the heteroatoms are O.

              17. The compound of claim 15, wherein the heteroatoms are S.

20           18. The compound of claim 1, wherein E is a fluorescent, water-soluble organic compound having a molecular weight in the range of from about 150 to 5000 daltons.

              19. The compound of claim 18, wherein E has the form (M,D), wherein D is a fluorescent dye and wherein M is a mobility modifying moiety that is a bond or an organic molecule having up to 25 100 atoms other than hydrogen selected from the group consisting of carbon, oxygen, nitrogen, phosphorus, boron, and sulfur.

              20. The compound of claim 18, wherein said electrophoretic tag, E, is defined by the formula:

30           A-M-D

wherein:

A is -C(=O)R, where R is aliphatic, aromatic, alicyclic or heterocyclic having from 1 to 8 carbon atoms and 0 to 4 heteroatoms selected from the group consisting of O, S. and N; -CH<sub>2</sub>-C(=O)-NH-CHO; -SO<sub>2</sub>H; -CH<sub>2</sub>-C(=O)O-CHO; -C(=O)NH-(CH<sub>2</sub>)<sub>n</sub>-NH-C(=O)-(C<sub>6</sub>H<sub>5</sub>), where n is in the range of from 2 to 12;

D is a fluorescent dye; and

M is a bond or an organic molecule having up to 100 atoms other than hydrogen selected from the group consisting of carbon, oxygen, nitrogen, phosphorus, boron, and sulfur, wherein the total molecular weight of E is within the range of from about 150 to about 5000 daltons.

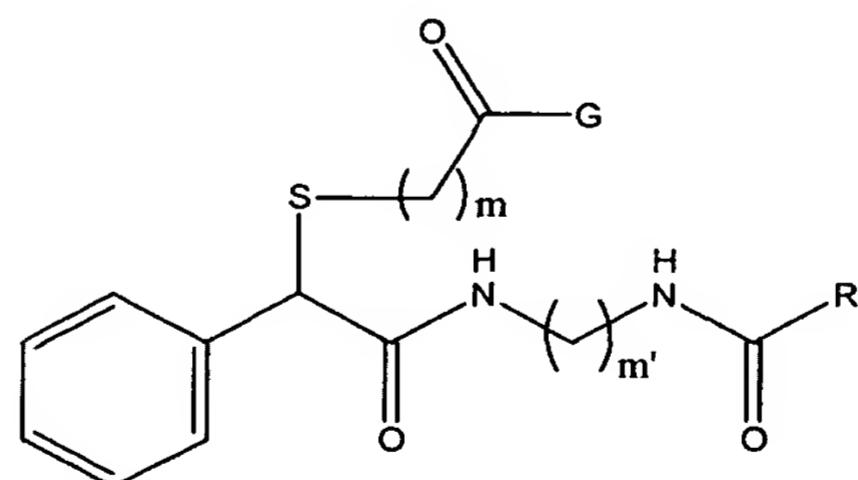
10

21. The compound of claim 20, wherein D is a fluorescein dye.

22. The compound of claim 21, wherein the fluorescein is selected from the group consisting of 5- and 6-carboxyfluorescein, 5- and 6-carboxy-4,7-dichlorofluorescein, 2',7'-dimethoxy-5- and 6-carboxy-4,7-dichlorofluorescein, 2',7'-dimethoxy-4',5'-dichloro-5- and 6-carboxyfluorescein, 2',7'-dimethoxy-4',5'-dichloro-5- and 6-carboxy-4,7-dichlorofluorescein, 1',2',7',8'-dibenzo-5- and 6-carboxy-4,7-dichlorofluorescein, 1',2',7',8'-dibenzo-4',5'-dichloro-5- and 6-carboxy-4,7-dichlorofluorescein, 2',7'-dichloro-5- and 6-carboxy-4,7-dichlorofluorescein, and 2',4',5',7'-tetrachloro-5- and 6-carboxy-4,7-dichlorofluorescein.

20

23. A compound of formula:



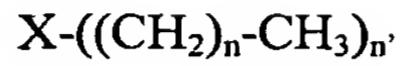
25 wherein:

G is a lipophilic moiety capable of incorporating into a lipid membrane;

R comprises a detectable moiety; and

m and m' are integers independently chosen from 1 to 10.

24. The compound of claim 23, wherein G is:



wherein X is a direct bond, O, S, or N;

5        n is an integer between 5 and 25; and  
n' is 1 or 2.

25. The compound of claim 24, wherein X is O and n' is 1.

10      26. The compound of claim 24, wherein X is N.

27. The compound of claim 26, wherein n' is 2.

15      28. The compound of claim 24, wherein R comprises a fluorescent, water-soluble organic compound having a molecular weight in the range of from about 150 to 2500 daltons.

29. The compound of claim 28, wherein R is a fluorescein dye.

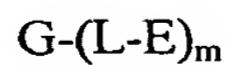
20      30. The compound of claim 23, wherein G is a sterol selected from the group consisting of cholesterol, vitamin D, phytosterols and steroid hormones.

31. The compound of claim 30, wherein G is cholesterol.

25      32. The compound of claim 30, wherein G is a steroid hormone selected from the group consisting of progesterone, testosterone and estrone.

33. The compound of claim 23, wherein G is selected from the group consisting of myristic acid, palmitic acid, stearic acid and sphingosine.

30      34. A mixture comprising a plurality of compounds having the formula:



wherein:

G is a lipophilic moiety capable of incorporating into a lipid membrane;

L is a cleavable linker;  
E is an electrophoretic tag;  
m is an integer greater than 1 and less than 100; and  
wherein E of each compound of the plurality is individually detectable.

5

35. The mixture of claim 34, wherein G is an alkyl group.

36. The mixture of claim 35, wherein the alkyl group has about 10 to 30 carbon atoms.

10

37. The mixture of claim 35, wherein the alkyl group is straight chain.

38. The mixture of claim 35, wherein the alkyl group is alicyclic.

39. The mixture of claim 34, wherein the cleavable linkage is an oxidation-labile linkage.

15

40. The mixture of claim 39, wherein the oxidation-labile linkage is selected from the group consisting of olefins, thioethers, selenoethers, thiazoles, oxazoles, and imidazole.

20

41. The mixture of claim 34, wherein E is a fluorescent, water-soluble organic compound having a molecular weight in the range of from about 150 to 2500 daltons.

25

42. The mixture of claim 41, wherein E has the form (M,D), wherein D is a fluorescent dye and wherein M is a mobility modifying moiety that is a bond or an organic molecule having up to 100 atoms other than hydrogen selected from the group consisting of carbon, oxygen, nitrogen, phosphorus, boron, and sulfur.

43. The mixture of claim 41, wherein E is defined by the formula:

A-M-D

wherein:

30

A is -C(=O)R, where R is aliphatic, aromatic, alicyclic or heterocyclic having from 1 to 8 carbon atoms and 0 to 4 heteroatoms selected from the group consisting of O, S. and N; -CH<sub>2</sub>-C(=O)-NH-CHO; -SO<sub>2</sub>H; -CH<sub>2</sub>-C(=O)O-CHO; -C(=O)NH-(CH<sub>2</sub>)<sub>n</sub>-NH-C(=O)C(=O)-(C<sub>6</sub>H<sub>5</sub>), where n is in the range of from 2 to 12;

D is a fluorescent dye; and

M is a bond or an organic molecule having up to 100 atoms other than hydrogen selected from the group consisting of carbon, oxygen, nitrogen, phosphorus, boron, and sulfur, wherein the total molecular weight of E is within the range of from about 150 to about 5000 daltons.

5

44. The mixture of claim 43, wherein D is a fluorescein dye.

45. Lipid membranes labeled with compounds of formula:



10 wherein:

G is a lipophilic moiety capable of incorporating into a lipid membrane;

L is a cleavable linker;

E is an electrophoretic tag; and

m is an integer greater than 1 and less than 100.

15

46. The lipid membranes of claim 45, wherein the compounds are incorporated into the structure of the membranes.

47. The lipid membranes of claim 45, wherein the lipid membranes comprise individual cells.

20

48. The lipid membranes of claim 45, wherein the lipid membranes comprise a tissue comprised of multiple populations of cells.

49. The lipid membranes of claim 45, wherein the lipid membranes comprise liposomes.

25

50. The lipid membranes of claim 45, wherein G is an alkyl group.

51. The lipid membranes of claim 50, wherein the alkyl group has about 10 to 20 carbon atoms.

30

52. The lipid membranes of claim 50, wherein the alkyl group is straight chain.

53. The lipid membranes of claim 50, wherein the alkyl group is alicyclic.

54. The lipid membranes of claim 45, wherein the cleavable linkage is an oxidation-labile linkage.

55. The lipid membranes of claim 54, wherein the oxidation-labile linkage is selected from the group consisting of olefins, thioethers, selenoethers, thiazoles, oxazoles, and imidazole.

56. The lipid membranes of claim 45, wherein each E is separately detectable.